

MUSLIM MINING IN THE IBERIAN PENINSULA (PART I)

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INTRODUCTION

In 711 AD, Muslims from North Africa crossed the Straits of Gibraltar and conquered most of Christian Visigothic Spain. Confrontations between Muslims and Berbers allowed Abd Al-Rahman I to come to the throne of the Ommiad dynasty in 756 and gain political independence of Al-Andalus from Baghdad. In 929, religious independence was also achieved when Abd Al-Rahman III proclaimed himself the Caliph of Cordova. With this victory, the Ommiads sought to consolidate the commercial routes in the western Mediterranean, thus securing the gold supply from North Africa. Cordova, the capital city of Caliphate, reached 100,000 inhabitants and became the most important metropolis at that time. It became a great cultural, industrial, and mining centre, especially when Caliph Al-Hakam II ascended the throne in 961.

Breaking up the Caliphate into small territories called “taifas” (party) took place at the beginning of the 11th century. Their weakness allowed the northern Christian States to recover some territory. In 1085, the Almoravides from North Africa brought about re-unification of the territories; however, in the 12th century, they were defeated by the Christians in Spain and by the Almohades in North Africa. The Almohades were a religious reformist movement from the Atlas Mountains in Morocco who occupied Seville in 1147, conquered the southeast part of Spain in 1172, and had an important economic and mining development under their rule. Meanwhile, the Spanish Christian territories joined together in the Holy Alliance and defeated the Muslims in the Navas de Tolosa battle in 1212. At the end of the 13th century, the territory occupied by the Muslims was reduced to the Granada kingdom, which was captured by the Catholic monarchs Ferdinand and Isabella in 1492.

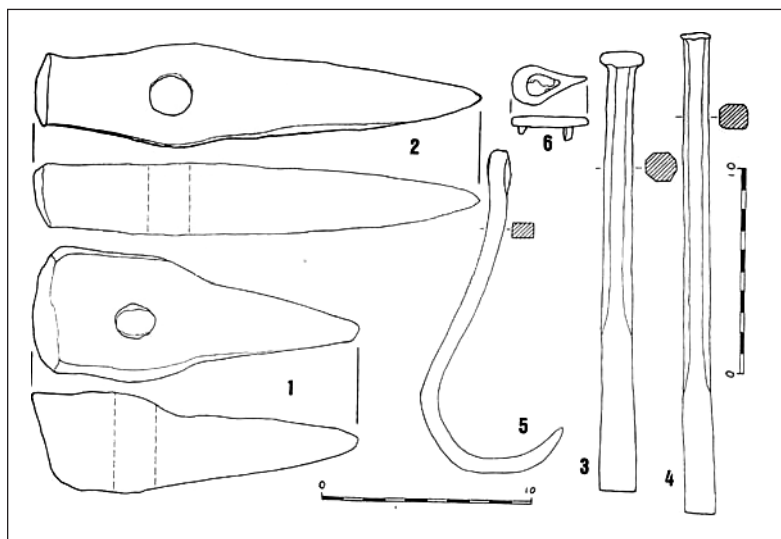
The Muslims stayed in Spain for about seven centuries, and

made important contributions to science and culture. Numerous Arabic words and toponyms related to mining are preserved in the Spanish language such as almaden (mine). This is the case of some Spanish towns like Almaden and Almadenejos (Ciudad Real), Almaden de la Plata (Seville), Almada (near Lisbon), and the hill of the Almadenes in Otero de Herreros (Segovia). Some other metallurgical words are algaraviz (iron tube placed in the nozzle of fan blowers), aljez (gypsum) as in the town Los Algezares (Murcia), alfoli or alfoz (salt storage) as in the town Alfaz del Pi (Alicante), almagre (red iron ore) as in Sierra Almagrera (Almeria), Almagro (Ciudad Real) or Almagreira (Portugal), azogue (mercury) as in the Valdeazogues River (Ciudad Real), atutia (zinc sulfate), azofar (brass), ceni (fine brass), azaque (gold-based legal tax), aludel (ceramic piping in distillation furnaces), etc. Some of these words are often incorporated into the Spanish language as found in an 18th century almagre mill in Olvega (Soria), or in the aludel furnaces found in Almaden from the 17th to 20th centuries.

There are also a good deal of bibliographic sources by historians, poets, and geographers who introduced mining



Map showing Muslim mining locations in Iberia.



Mining tools from archaeological sites in Los Vascos, Toledo, Spain (Cossin, 1996)

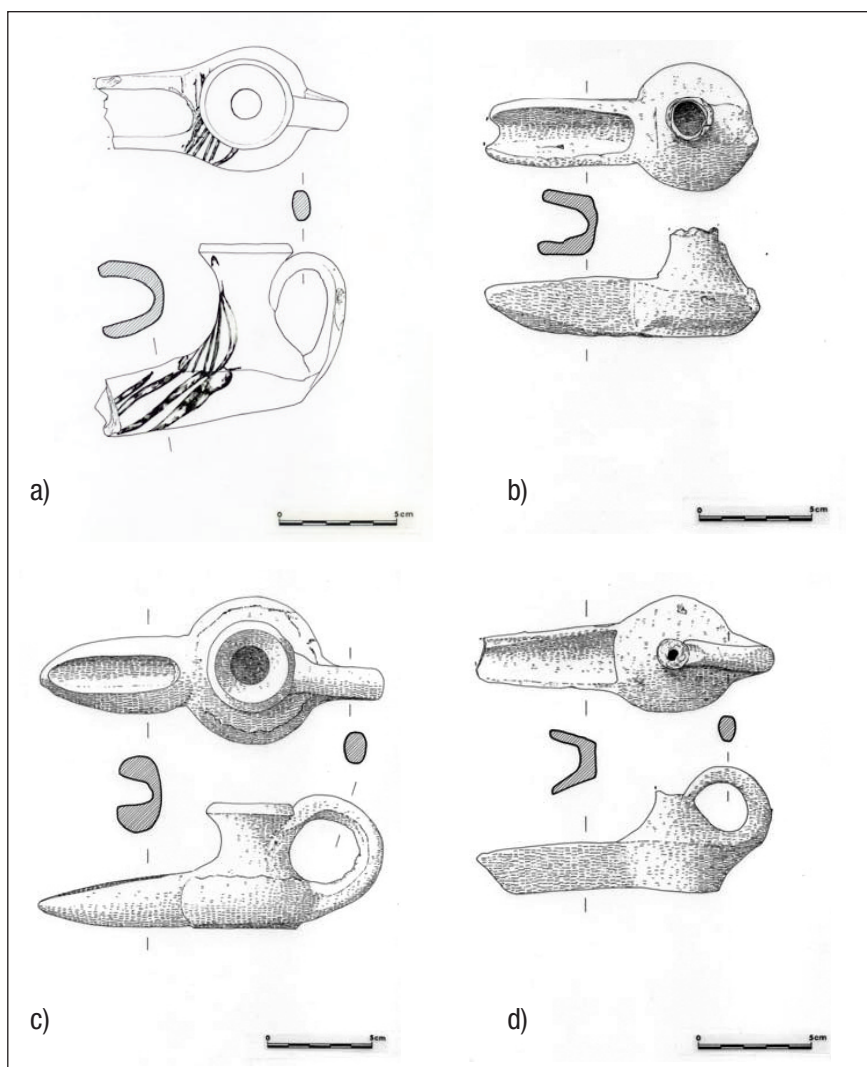
or metallurgical data in Spanish history. Such is the case of Ibn Hawqal in the 10th century; Ahmed Ben Isa Al-Arrazi, known as the Rasis, at the end of the 10th century; Al Biruni and Ibn Hazim in the 11th century; the geographer Az Zuhri from Almeria, and the geographer and doctor, Al Idrisi, from Ceuta in the 12th century; Chihab-eddin Ahmed Ben Yahya (died in 1348), and the last of the great Spanish Muslim historians, Ibri Al Khatib, born in Loja (Granada) in the 14th century; and many others. There are also compilations of works on Spanish Muslim mining, such as those of the French historians Fagan (1924), Levi Provenzal (1950), Abdalla Ibn Ibrahim El Omeir (1991), and Vallvé Bermejo (1995), as well as archeological studies by mining engineer Carbonell (1929) and by Cressier, Cossin, and others.

MINING

Muslims usually re-worked mines that had been abandoned by the Romans. Archaeological excavations show the methods of exploitation and the tools used. Carbonell (1929) mentioned the chamber and pillars in extracting the Miocene limestone in the Palacios de la Galiana in Cordova. Iron tools, such as hammers, picks, pitching tools, chisels, liners, bedes, etc. were common. Lighting was provided by the Arabic oil lamp. Some of

these lamps from Rio Tinto mines in Huelva are preserved at the Madrid School of Mining Engineering; others were found by Carbonell in the mines of Villaviciosa, Belalcazar, and Cerro Muriano in Cordova. Drainage was done by daydrift if the orography permitted it or, in some mining sites, through bucket chain elevators made of pottery, as they appeared in small earthenware jars in Barranco de Mirabuenos mine (Villaviciosa, Cordova).

Gypsum (aljez), together with brick and stone, were often used in building. Around the area of Algezares (Murcia), shaft furnaces that were used to dehydrate gypsum are still known as Moorish furnaces. Lime was obtained in furnaces of similar structure. White marble from Macael (Almeria) or the red marble from Bacaes (Almeria)



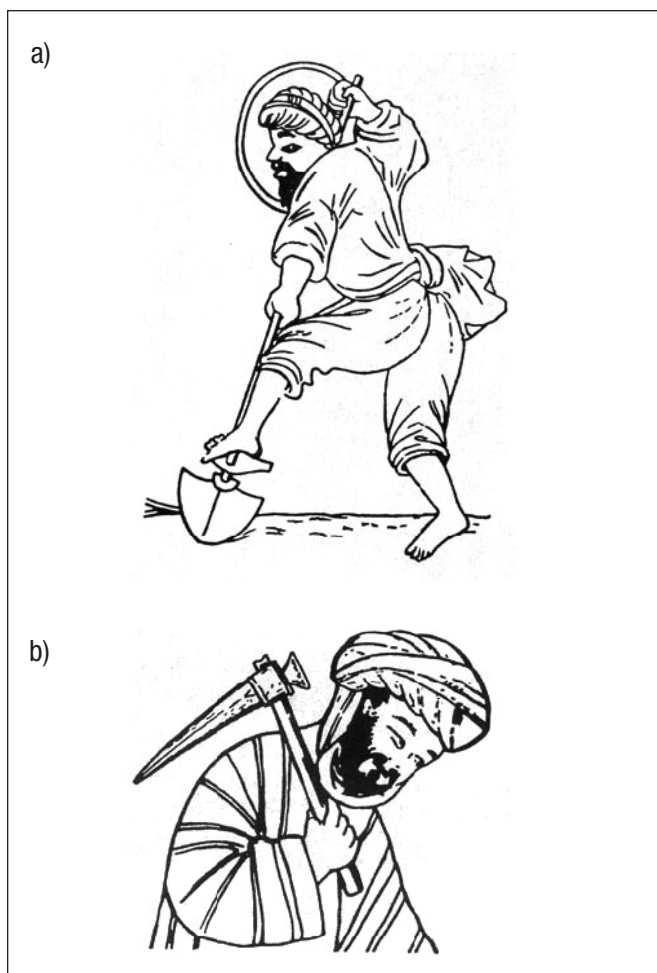
Muslim oil lamps from the mines of Rio Tinto: a) Almohade oil lamp (about 1170-1190); b) Ommiad oil lamp 11th century; c) Almoravide oil lamp (1120-1130); d) oil lamp from Caliphate Period (about 930)

were highly sought after. Talc and magnesium were exploited in Andalusia. Salt was exploited in the mines around the area of Remolinos (Zaragoza) and in Espartinas (Madrid), where Arabic pottery was found near the pithead. Salt was also produced in coastal saltworks in the area of La Mata and Torreveja (Alicante), Ibiza (Balears), Roquetas (Almeria), Motril (Granada), and the bay of Cadiz, as well

as in some Portuguese estuaries. The salted shafts of Loja (Granada) were exploited in the Nazari territory, those of the mountains of Las Salinas near Ronda (Malaga), and those of Mala (from the Arabic “mallaha,” meaning salt mine), as salt exploitation and sale were a royal monopoly of the dynasty. Salt was a necessity for the food industry (e.g. cheese manufacture and cattle raising).

Al ‘Udri, an 11th century geographer from Almeria, mentioned asphalt exploitation in the outskirts of Sigüenza (Guadalajara). Asphalt was used for caulking (from Arabic “qalfat”) ships and as a weapon in the form of Greek fire. In the archaeological museum of Murcia (Spain), there is a Muslim furnace that produces glazed pottery. Copper salts were employed for green or blue pottery, chromium salts for yellow pottery, and cobalt salts for dark blue pottery. Utensils made from this type of pottery are still manufactured in Ubeda (Jaen) according to the Spanish-Muslim tradition. Alum (jebe) was extracted in Cabo de Gata (Almeria) and the area of Niebla (Huelva), and was mostly used as a mordant in dyeing. Saltpetre was used to manufacture gunpowder for military purposes in the battle of Aledo (Murcia).

Thanks to Arabic literature, we know some of the places where semiprecious and other stones were obtained: for example, the little red rubies from Montemayor (Cordova), the Lapis lazuli from Lorca (Murcia), the garnets from the Sulmo mine near Sintra (Portugal) as well as from the Granatillas stream in Almeria (Spain), the beryl (Balur, from which the Spanish word “abalario” comes) from Cabra (Cordova) and Evora (Portugal), the jet black from the lignite basin in Utrillas (Teruel), the agates from the Gata Cape (Almeria), and the variscites from Palezuelos (Zamora). The name of this province might come from the Arabic Word “zabarah” meaning emerald. Other semi-precious stones were amber-gris from the coast of Cadiz, red coral from Vera (Almeria), pearls (aljofar) from the Mediterranean coasts, magnetite (magnet stone) from Cehegin (Murcia), the Jewish stone from Alpuente Castle (Valencia), and marcasites from Ubeda (Jaen). ■



Muslim miners: a) 13th century (National Library, Paris); b) 14th century (University of Edinburgh, UK).

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